



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

*cm*

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/679,564

10/06/2003

Thomas C. Anthony

10014232-1

3114

7590

09/16/2004

HEWLETT-PACKARD COMPANY  
Intellectual Property Administration  
P.O. Box 272400  
Fort Collins, CO 80527-2400

EXAMINER

NGUYEN, THINH T

ART UNIT

PAPER NUMBER

2818

DATE MAILED: 09/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/679,564

Applicant(s)

ANTHONY, THOMAS C.

Examiner

Thinh T Nguyen

Art Unit

2818

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 03 August 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 October 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

Art Unit: 2818

### **DETAILED OFFICE ACTION**

1. Applicant's election of claim 1-23 without traverse for prosecution in the communication with the Office on August 3<sup>rd</sup> 2004 is acknowledged.

#### **Specification**

2. The specification has been checked to the extent necessary to determine the presence of all possible minor errors. However, the applicant cooperation is requested in correcting any errors of which the applicant may become aware in the specification.

#### **Claim Rejections - 35 USC § 102**

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102(b/e) that form the basis for the rejections under this section made in this office action.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Art Unit: 2818

4. Claims 1-4,6-22 are rejected under 35 U.S.C. 102(e) as being anticipated by Nejad et al. (U.S. Patent 6,716,644).

REGARDING CLAIM 1

Nejad et al. (the abstract, fig 13,fig 14, fig 19) disclose a magnetic memory comprising: an insulator ( fig 19, layer 54) having a trench ; a first conductor in the trench ( fig 19 layer 62,column 4 line 61) a first magnetic layer in the trench ( fig 13 layer 64 , column 4 lines 45-50) and adjacent to the first conductor; and a second magnetic layer( fig 19 layer 89,column 5 line 66) outside the trench.

REGARDING CLAIM 2

Nejad et al. (the abstract, fig 13,fig 14, fig 19) disclose a magnetic memory comprising a barrier layer( fig 14 layer 80) outside the trench and disposed between the first magnetic layer (fig 14 layer 64 ) and the second magnetic layer ( fig 14 layer 89).

REGARDING CLAIM 3

Nejad et al. (the abstract, fig 13,fig 14, fig 19) disclose a magnetic memory comprising a barrier layer ( fig 14,fig 19 layer 80,,column 5 line 35-36) that was made of Aluminum Oxide an insulator that prevent shorts between the first and the second magnetic layer

REGARDING CLAIM 4

Nejad et al. (the abstract, fig 13,fig 14, fig 19) disclose a magnetic memory where the first magnetic layer ( fig 14, layer 64) is self-aligned with the first conductor (fig 14 layer 62) along at least one dimension of the trench.

REGARDING CLAIM 6

Nejad et al. (the abstract, fig 19) disclose a magnetic memory where the second magnetic layer ( fig 19 layer 89) is patterned into bits aligned with the first magnetic layer( fig 19 layer 64).

REGARDING CLAIM 7

Nejad et al. (the abstract, fig 19) disclose a magnetic memory comprising a second conductor ( fig 19 layer 93) disposed over the second magnetic layer, where the second conductor is narrower than the second magnetic layer( fig 19 layer 89)

REGARDING CLAIM 8

Nejad et al. (the abstract, fig 19) disclose a magnetic memory comprising a second conductor (fig 19 layer 93, column 7 lines 5-20) disposed over the second magnetic layer, where the second conductor is patterned into lines and the first magnetic layer is patterned into bits with a line mask pattern.

REGARDING CLAIM 9

Nejad et al. (the abstract, fig 19, column 7 line 1-20) disclose a magnetic memory comprising a second conductor disposed over the second magnetic layer and a barrier layer disposed between the first magnetic layer and the second magnetic layer, where the second conductor and the second magnetic layer are patterned the same.

REGARDING CLAIM 10

Nejad et al. (the abstract, fig 19) disclose a magnetic memory where the first magnetic layer ( fig 19 layer 64) comprises a sense layer.

## REGARDING CLAIM 11

Nejad et al. (the abstract, fig 19, column 4 lines 45-50) disclose a magnetic memory where the first conductor ( fig 19 layer 62, column 1 line 42) comprises: a ferromagnetic cladding layer ( fig 19 layer 59) lining the trench and copper.

## REGARDING CLAIM 12

Nejad et al. (the abstract, fig 19, column 1 lines 24-27) disclose a magnetic memory comprising: an array of memory cells; first conductive lines ( fig 19 layer 62), second conductive lines (fig 19 layer 93) crossing the first conductive lines at memory cells in the array of memory cells, where a memory cell in the array of memory cells comprises:

a first magnetic layer ( fig 14 layer 64) inside an insulating recess; a second magnetic layer outside the insulating recess ( fig 16, fig 19 layer 89), and a barrier layer ( fig 19 layer 80) between the first magnetic layer and the second magnetic layer.

## REGARDING CLAIM 13

Nejad et al. (the abstract, fig 19, column 1 lines 24-27) disclose a magnetic memory where the barrier layer ( fig 19 layer 80) is in a plane over the insulating recess.

## REGARDING CLAIM 14

Nejad et al. (the abstract, fig 19) disclose a magnetic memory where the first conductive lines (fig 19 layer 62) are in parallel insulating trenches formed in an insulator.

## REGARDING CLAIM 15

Nejad et al. (the abstract, fig 19) disclose a magnetic memory where the array of memory cells is a three dimensional macro-array.

REGARDING CLAIM 16

Nejad et al. (the abstract, fig 19) disclose a magnetic random access memory (MRAM) comprising a write circuit configured to provide write currents to set memory cell states and a read circuit configured to provide a sense voltage and a sense current to read memory cell states since the read and write functions are inherent to MRAM.

REGARDING CLAIM 17

Nejad et al. (the abstract, fig 19) disclose a magnetic memory where the first magnetic layer crosses a plurality of memory cells.

REGARDING CLAIM 18

Nejad et al. (the abstract, fig 11,fig 12, fig 19) disclose a magnetic memory comprising: means for self-aligning at least one dimension of a magnetic layer with a conductor in a dielectric; and means for supporting a planar barrier layer adjacent to the magnetic layer and the dielectric layer.

REGARDING CLAIM 19,20

Nejad et al. (the abstract, fig 11,fig 12, fig 19) disclose a magnetic memory , where the means for self-aligning comprises side surfaces of a trench in the dielectric and where the means for supporting a planar barrier layer comprises the magnetic layer and the dielectric planarized to a planar surface.

REGARDING CLAIM 21

Nejad et al. (the abstract, fig 19) disclose a magnetic memory cell comprising: a first magnetic layer ( fig 14 layer 64) in a recess in a dielectric; a barrier layer ( fig 14 layer 80)

Art Unit: 2818

formed in a plane on the first magnetic layer and the dielectric; and a second magnetic layer (fig 14 layer 89 ) formed on the barrier layer.

**REGARDING CLAIM 22**

Nejad et al. (the abstract, fig 19) disclose a magnetic memory where the first magnetic layer ( fig 19 layer 64) comprises a sense layer and the second magnetic layer ( fig 19 layer 89) is a reference layer

**Claim Rejections - 35 USC § 103**

5. The following is a quotation of U.S.C. 103(a) which form the basis for all obviousness rejections set forth in this office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 5, 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nejad et al.(U.S. patent 6,716,644) in view of further remark.

**REGARDING CLAIM 5,23**

Nejad et al. (the abstract, fig 19) disclose all the invention including a reference layer 89 except for the inclusion of the reference layer in the trench but this amount to a mere reversal of part.. It would have been obvious to one having ordinary skill in the art at the time the invention was made to put the reference magnetic layer in the trench since it has been held that a mere reversal of part involves only routine skill in the art.



7. When responding to the office action, Applicants are advised to provide the examiner with the line numbers and the page numbers in the application and/or references cited to assist the examiner to locate the appropriate paragraphs.

8. A shortened statutory period for response to this action is set to expire 3 (three) months and 0 (zero) day from the day of this letter. Failure to respond within the period for response will cause the application to be abandoned (see M.P.E.P. 710.02(b)).

### **CONCLUSION**

9. The prior arts made of record and not relied upon are considered pertinent to applicant disclosure: Steimle et al. (US patent Application Publication US 2004/0087163 A1) disclose a method for forming magnetic clad bit line.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thinh T Nguyen whose telephone number is 571-272-1790.

The examiner can normally be reached on Monday-Friday 9:00am-6:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached at 571-272-1787.

The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Art Unit: 2818

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

**Thinh T. Nguyen**

TTN

Art Unit 2818



**David Nelms**  
Supervisory Patent Examiner  
Technology Center 2800